

Proposed Experiments for Chemistry Group1. Infectious Development Experiments.

In the final technical report of the Image Analysis Program (Report No. TO-B 67-20 on Image Analysis (U), dated April 21, 1967) experiments were described which demonstrated that an unexposed grain was more likely to develop when in the neighborhood of a developing grain than when in isolation. This increased probability of development of such grains was termed the infectious development component. It is well known that the granular nature of the developed image consists of particles much larger than the primary emulsion grain size. Our report reveals that such large developed particles are not due to 'expansion' of the grains on development but rather by this infectiousness. Reduction or elimination of the infectiousness would lead, therefore, to a much lower granularity and a much better resolution.

The purpose of the proposed series of experiments would be to establish some means of reducing this infectiousness effect. Most probably it would be by changing developer chemistry, although ultra-sonics have also been suggested.

- (a) Using sub-monolayer model emulsion coatings similar to that used by establish the development probabilities of clumped and isolated grains as a function of exposure (see Image Analysis Report for more details of experiment).
- (b) Express exposure in terms of total percentage grains developed. In this way, the development probabilities of interest will not change merely by changes in the activity that must accompany alteration of the developer formulation.
- (c) Study these probabilities as systematic changes are made; developer condition and processing conditions. Establish which condition or component influences the infectiousness most.

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2. Adjacency Effects.

It is well known that under certain development conditions, spurious densities are produced on the edges of images. These edge effects arise from many sources but the most important is due to low conditions (i. e. dilute developed, no agitation or viscous development). While such edge effects may produce psychologically adverse images, the enhanced edges may be of some advantage if mensuration is required. The peak in density in the vicinity of an edge defines a point of reference which, although it may not coincide with the edge, provides a common and unambiguous point of measurement. Errors between peak position and edge position may be established later.

In order to evaluate the usefulness of these edges:

1. Using the dupe films 8430 and/or 5427, establish developing conditions which provide greatest reproducible adjacency effects. Suggested conditions are; motionless development, diluted developer, viscous developer.
2. Design a target which will provide imagery suitable for mensurational studies. Should include low contrast images because this is where image delineation may be useful.
3. Compare the variation in measurement of the micro images using edge enhancement processing with that of conventional processing.